Small Business Innovation Research/Small Business Tech Transfer

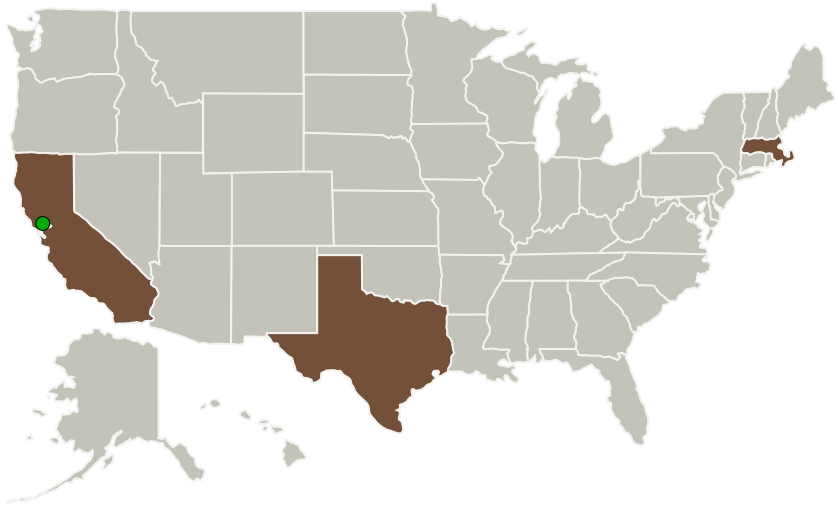
Flight Director In A Box: Using Learning to Develop Planning Agents For Exploration, Phase I

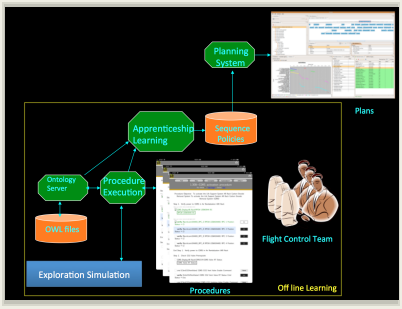
Completed Technology Project (2017 - 2018)

Project Introduction

TRACLabs has developed a procedure integrated development environment called PRIDE that is currently being used by NASA for ISS and Orion procedures. As these procedures execute, they log all the pertinent execution information. Automated planners, developed by NASA over the years will be used to sequence these procedures to achieve goals during exploration flights or for planetary base operations. TRACLabs has successfully integrated planning and procedure execution, but humans manually code the most likely sequence of activities for the planner to use, a practice that is sub optimal and fraught with error. As flight directors and their flight control teams train for exploration using PRIDE in simulated environments, the procedure sequences they develop for exploration can be captured along with all the execution data. TRACLabs proposes to use the resulting logs, along with archived telemetry, as a basis for applying apprenticeship learning to learn what procedures should be used in a given situation and in what order. Automated planners could then ingest these learned policies during explorations operations to yield plans as they would be generated from an experienced flight control team. Further, as the planner executes plans, we contend that the learner can continue to refine its policies during exploration missions.

Primary U.S. Work Locations and Key Partners





Flight Director In A Box: Using Learning to Develop Planning Agents For Exploration, Phase I Briefing Chart Image

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Organizations Performing Work	Role	Type	Location
TRACLabs, Inc.	Lead Organization	Industry	Webster, Texas
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California
Massachusetts Institute of Technology(MIT)	Supporting Organization	Academia	Cambridge, Massachusetts

Primary U.S. Work Locations	
California	Massachusetts
Texas	

Project Transitions

June 2017: Project Start

June 2018: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140840)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TRACLabs, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

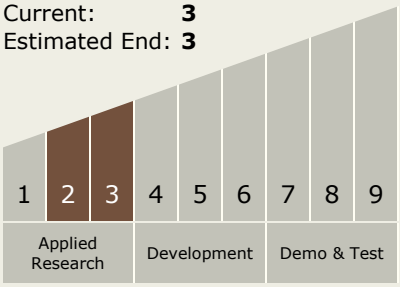
Carlos Torrez

Principal Investigator:

Russell Bonasso

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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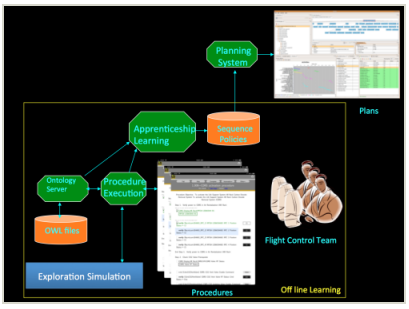
Images



Briefing Chart Image
Flight Director In A Box: Using Learning to Develop Planning Agents For Exploration, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/134277)*

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.4 Information Processing
    - TX11.4.2 Intelligent Data Understanding

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System